Improved Rooting of Cryptostegia Cuttings Callused on the Plant

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Vegetative propagation of plants of the first generation hybrid between *Cryptostegia grandiflora* and *C. madagascariensis,* having superior rubber content of leaves or high latex yield, is essential for increasing stocks of selected plants. Standard types of stem cuttings collected in various ways, subjected to different treatments, including the use of many growth promoting substances of various strengths, have been tried. The results indicate that with almost any type of material or treatment rooting takes place more rapidly and extensively where bottom heat can be applied in the propagating box and maintained at temperatures of 85° to 90° F., with the tops of the cuttings exposed to materially lower temperatures. During the summer such conditions cannot be maintained and rooting results generally have been much less satisfactory. Under the best conditions root production has been slow and, only in cuttings treated with Rootone or talc dust containing 1000 p.p.m. of naphthalene acetic acid or naphthyl acetamide, has the percentage with strong roots and satisfactory leaf development been fairly high.

Air-layering or marcottage of branches directly on the plants has been found a fairly satisfactory means of propagation. A relatively high proportion of the treated branches take root and the roots are stronger and more vigorous than are developed by most types of cuttings under the best treatments. Chief objection to the marcottage method is its cost in labor, material, and time.

In marcottage of Cryptostegia stems, the first step is the removal of a complete ring of bark one to two centimeters in length at the base of the portion to be rooted, being sure that no cambial tissue remains to bridge the girdled area. Such girdling does not kill the stem above it and several weeks after the marcotte box is applied a callus forms and roots may be expected to appear somewhat later. The success of this girdling method with marcottes suggested that girdling of stems from one to ten days before making cuttings might cause better and more prompt formation of roots on the cuttings, but extensive trials showed no advantage of such treatment over cuttings not previously girdled.

In harvesting these girdled stems for cuttings, or in the girdling of stems for marcotting, some were overlooked and remained on the plants without further attention. Several months later it was observed that these girdled stems were still alive and that a large callus had formed on each at the upper edge of the girdled area at what would have been the bottom of the cutting. Five

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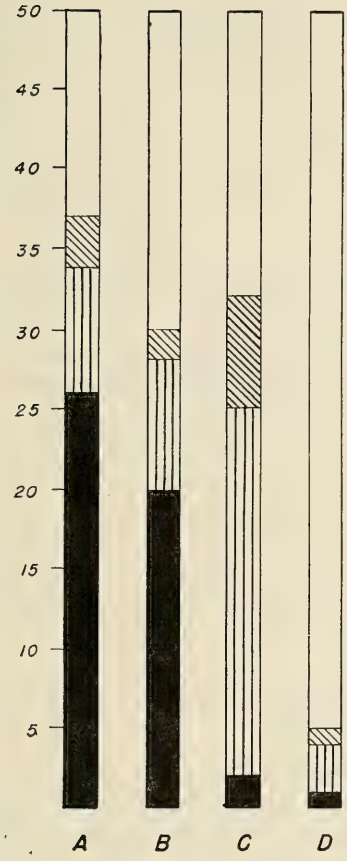

DIAGRAM 1

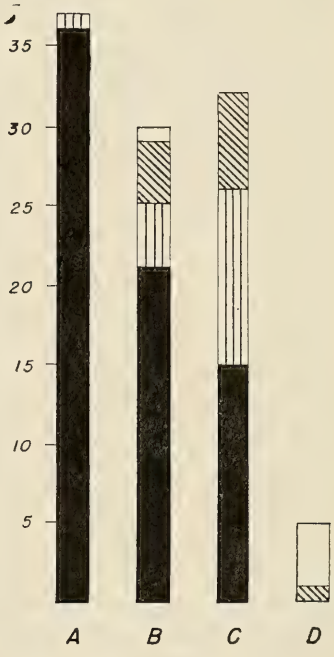

DIAGRAM 2

DIAGRAM 1. Total number of cuttings that rooted and time required for the roots to develop in 100 "old girdled" cuttings and 100 ungirdled cuttings, half of each lot being treated with Rootone and half left untreated. Columns A and B are "old girdled" cuttings; C and D are ungirdled cuttings. Cuttings in columns A and C treated with Rootone. Solid black portion of columns represents the cuttings that rooted in 10 days; vertically-hatched portion, the additional cuttings that rooted in 17 days; obliquely-hatched portion, the additional cuttings that rooted in 22 days; blank portion, the cuttings that failed to root in 22 days.

DIAGRAM 2. Character of roots produced by the cuttings shown as rooted in diagram 1, with arrangement of columns and treatment of cuttings in them the same. Black portion of columns represents cuttings that produced strong roots; vertically-hatched portion, cuttings with good roots; obliquely-hatched portion, cuttings with fair roots; blank portion, cuttings that developed only poor roots.

months after the girdling of these stems 84 were found to be heavily callused and cuttings were made of them, half having the callus dusted over with talc containing 4000 p.p.m. of indolebutyric acid and the other half left untreated. The cuttings were placed in the usual coarse sand medium in the propagating box with bottom heat. In seven days roots had begun to form and in twenty days 38 of the treated cuttings had rooted whereas only 23 of the untreated cuttings had roots. This rooting had taken place more quickly than with either marcottes or other cuttings previously tried and the roots were exceedingly sturdy, in most cases the equal of roots produced by marcotted stems.

These results led to a more extensive test of rooting what are referred to hereafter as "old girdled" cuttings. In the middle of December 1942, sufficient stems were girdled and left on the plants to provide 100 cuttings. These cuttings were harvested on July 13, 1943, having developed typical large calluses at the base. Fifty of these cuttings were placed in the propagating box without treatment and 50 were treated with Rootone dust over the callus. At the same time 100 cuttings of the same size were cut from the plant without previous girdling, half being treated with Rootone dust, the remainder being left untreated, and all placed in the propagating box with the "old girdled" cuttings. Inasmuch as this test was conducted in the summer, use of bottom heat to maintain a higher temperature differential at the base of the cuttings than at their top was impracticable.

All cuttings were examined for roots in ten days, on July 23, and again seven days later on July 30, with the final inspection five days later on August 4, when the experiment was discontinued.

The results of these experiments are presented in the two accompanying diagrams, the first of which shows the number of cuttings that rooted in each treatment and the rapidity with which they rooted. Not only did untreated "old girdled" cuttings root in greater abundance than did untreated check cuttings but their speed of rooting was even more rapid than with check cuttings treated with Rootone. Total rooting of untreated "old girdled" cuttings was essentially the same as with Rootone treated check cuttings. The most striking effect from the use of Rootone was to increase greatly the rooting of the ungirdled check cuttings. It also increased somewhat the rooting of "old girdled" cuttings. The relative speed of rooting in any of the cuttings appears not to have been materially affected by Rootone treatment.

Diagram 2 shows the effects of the different treatments upon the type of roots produced by the cuttings in diagram 1. It will be seen that only poor to fair roots were produced by untreated, ungirdled cuttings whereas the use of Rootone on ungirdled cuttings caused more than a third of them to produce strong roots and a similar number to produce good ones. A much higher proportion of untreated "old girdled" cuttings produced strong roots than where Rootone was used on ungirdled cuttings but the use of this substance on "old

girdled" cuttings strikingly increased the number with strong roots as all but one of the 37 cuttings produced roots in this category.

Thus it appears that girdling to cause formation of large calluses, with great food storage capacity, not only increases the rooting expectancy of cuttings but their speed of rooting and size of roots as well. These conditions also may be improved still further by use of Rootone on the callus at the time the cutting is made.

Another conclusion that may be drawn from these tests is that summer rooting of "old girdled" cuttings may be as good, if not better, than rooting in cooler weather when a temperature differential may be maintained with bottom heat.

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